

Ch. 17 Review Here are some good practice questions. Do not forget to read the chapter TWICE AND PRACTISE the questions from the ORANGE practice problem sheet.

Multiple Choice

- When 100 g of steam at 100°C changes to water at 100°C there is
 - a release of 33.5 kJ of energy.
 - an absorption of 33.5 kJ of energy.
 - an absorption of 226 kJ of energy.
 - a release of 226 kJ of energy.
- During the production of a small amount of material, there is a large decrease in temperature of the water in the calorimeter. What is the ΔH for the reaction?
 - a large and positive.
 - small and positive.
 - small and negative.
 - large and negative.
- What is 4.18?
 - the heat required to raise the temperature of 1 litre of water one Celsius degree.
 - the heat required to raise the temperature of 1 mole of water one Celsius degree.
 - the heat required to raise the temperature of 1 gram of a substance one Celsius degree.
 - the heat required to raise the temperature of 1 mole of a substance one Celsius degree.
- What change is probably happening when energy is added to a substance, but the substance's temperature does not rise?
 - gas to a liquid.
 - gas to a solid.
 - liquid to a gas.
 - liquid to a solid.
- Which statement correctly describes the energy changes when a solid changes to a liquid at a constant temperature?
 - the potential energy remains constant and the kinetic energy changes.
 - the potential energy increases and the kinetic energy remains constant.
 - the potential energy increases and the kinetic energy decreases.
 - the potential energy decreases and the kinetic energy decreases.
- The heat of formation of sodium chlorate [$\text{NaClO}_3(\text{s})$] is -53 kJ/mol. The balanced equation which expresses this information is
 - $\text{Na}(\text{s}) + \text{Cl}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow \text{NaClO}_2(\text{g}) + 53 \text{ kJ}$
 - $\text{Na}(\text{s}) + \frac{1}{2}\text{Cl}_2(\text{g}) + \frac{3}{2}\text{O}_2(\text{g}) \rightarrow \text{NaClO}_3(\text{s}) + 53 \text{ kJ}$
 - $\text{Na}(\text{s}) + \frac{1}{2}\text{Cl}_2(\text{g}) + \frac{3}{2}\text{O}_2(\text{g}) + 53 \text{ kJ} \rightarrow \text{NaClO}_3(\text{s})$
 - $\text{Na}(\text{s}) + \text{Cl}_2(\text{g}) + 3\text{O}_2(\text{g}) \rightarrow \text{NaClO}_3(\text{g}) + 53 \text{ kJ}$
- A reaction has a positive ΔH value. This means that
 - the reaction is exothermic
 - the reaction releases energy
 - during the reaction, the surroundings get colder
 - the heat content of the products is less than that of the reactants.
- Which statement is correct?
 - $H_{\text{f}}(\text{products}) = H_{\text{f}}(\text{reactants})$
 - $\Delta H = nH_{\text{f}}(\text{products}) - nH_{\text{f}}(\text{reactants})$
 - $\Delta H = nH_{\text{f}}(\text{reactants}) - nH_{\text{f}}(\text{products})$
 - $nH_{\text{f}}(\text{products}) = \Delta H - nH_{\text{f}}(\text{reactants})$

Problems

1. Calculate the total energy change of 500. g of Al (liquid) solidifying from 95°C to 23°C . The molar enthalpy of solidification of aluminum is 10.67 kJ/mol . The specific heat of liquid aluminum is $1.09 \text{ J/g}^{\circ}\text{C}$ and that of solid aluminum is $0.897 \text{ J/g}^{\circ}\text{C}$.

2. 750 g of ammonium nitrate is dissolved in 650 ml of water. This causes the temperature to drop from 25.6°C to 1.02°C . What is the molar enthalpy of ammonium nitrate? Assume the solution is dilute!

3. Determine the heat required to convert 62.0 g of ice at -10.3°C to water at 0.0°C .

4. The molar enthalpy for the combustion of octane is -1.3 MJ/mol . Write a balanced equation to communicate enthalpy in the reaction.

5. You have a sample of water with a mass of 23.0 grams at a temperature of -46.0°C . How many kJ of energy are required to carry out each step?

A) heat the ice to 0.0°C ?

B) melt the ice?

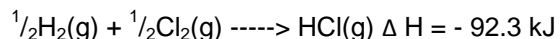
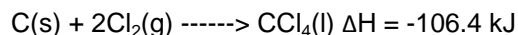
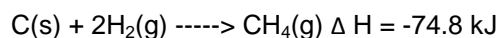
C) heat the water from 0.0°C to 100.0°C ?

D) boil the water?

E) heat the steam from 100.0°C to 109.0°C ?

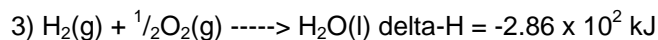
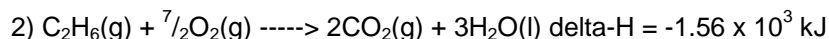
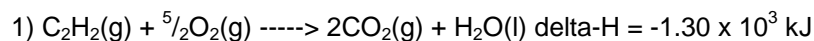
F) Draw a phase diagram to show A to E.

6. Use the following information to answer this question.



The heat of reaction for $\text{CH}_4\text{(g)} + 4\text{Cl}_2\text{(g)} \rightarrow \text{CCl}_4\text{(l)} + 4\text{HCl(g)}$ is ?

7. Given the following thermochemical data:



What is the ΔH for the reaction: $\text{C}_2\text{H}_2\text{(g)} + 2\text{H}_2\text{(g)} \rightarrow \text{C}_2\text{H}_6\text{(g)}$ $\Delta H = ?$

8. Draw a potential energy diagram for the following reaction...



Label the following on your graph:

A. Reactants

B. Products

C. Change in enthalpy